2818

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October 29, 2003

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Commissioner for Patents
P.O. Box 1450
Washington, D.C. 20231

RECEIVED
OCT 30 2003
TECHNOLOGY CENTER 2800

Re: U.S. Utility Patent Application
Appl. No. 09/604,097; Filed June 27, 2000
For: **Semiconductor Light Emitting Device And Manufacturing Method Therefor**
Inventors: Yukio SHAKUDA
Our Ref: 2005.0020003 (As Amended)

Sir:

Transmitted herewith for appropriate action are the following documents:

1. Fifth Supplemental Information Disclosure Statement;

2. Form PTO-1449 listing **FOUR HUNDRED EIGHTY-SIX (486)** documents (47 pages);

3. Copies of the **FOUR HUNDRED EIGHTY-SIX (486)** cited document(s) as listed on Form PTO-1449; and

4. One (1) return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier. In the event that extensions of time are necessary to prevent abandonment of this patent application, then such extensions of time are hereby petitioned.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Thomas C. Fiala

Attorney for Applicants

Registration No. 43,610

TCF/mjg

Enclosures

SKGF_DC1:193533.1

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Yukio SHAKUDA
Appl. No. 09/604,097
Filed: June 27, 2000
For: **Semiconductor Light Emitting Device And Manufacturing Method Therefor**

Confirmation No. 6648
Art Unit: 2828
Examiner: James W. Davie
Atty. Docket: 2005.0020003

# Fifth Supplemental Information Disclosure Statement

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Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Listed on accompanying Form PTO-1449 are documents that may be considered material to the examination of this application, in compliance with the duty of disclosure requirements of 37 C.F.R. §§ 1.56, 1.97 and 1.98.

Applicant has listed publication dates on the attached PTO-1449 based on information presently available to the undersigned. However, the listed publication dates should not be construed as an admission that the information was actually published on the date indicated.

Applicant reserves the right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may not be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered.

This statement should not be construed as a representation that a search has been made, or that information more material to the examination of the present patent application does not exist. The Examiner is specifically requested not to rely solely on the material submitted herewith.

This Information Disclosure Statement is being filed before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No statement or fee is required. 37 C.F.R. § 1.97(b).

Documents AA1-AD1, AA2-AD2, AA3-AD3, AA4-AD4, AA5-AD5, AA6-AD6, AA7-AD7, AA8-AD8, AA9-AD9, AA10-AD10, AA11-AD11, AA12-AD12, AA13-AD13, AA14-AD14, AA15-AD15, AA16-AD16, AA17-AD17, AA18-AD18, AA19-AD19, AA20-AD20, AA21-AD21, AA22-AD22, AA23-AD23, AA24-AD24, AA25-AD25, AA26-AD26, AA27-AD27, AA28-AD28, AA29-AD29, AA30-AD30, AA31-AD31, AA32-AD32, AA33-AD33, AA34-AD34, AA35-AD35, AA36-AD36, AA37-AD37, AA38-AD38 and AA39-AD39 are in a foreign language. For an explanation of relevance, an English-language abstract is attached as the first page of each document.

It is respectfully requested that the Examiner initial and return a copy of the enclosed PTO-1449, and indicate in the official file wrapper of this patent application that the documents have been considered.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Thomas C. Fiala
Attorney for Applicant
Registration No. 43,610

Date: 10/29/03

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FORM PTO-1449

FIFTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

| ATTY. DOCKET NO. | APPLICATION NO. |
|---|---|
| 2005.0020003 | 09/604,097 |
| APPLICANTS | |
| Yukio SHAKUDA | |
| FILING DATE | GROUP |
| June 27, 2000 | 2828 |

**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA1 | 57-153479 A | 09/1982 | JP | | | Abstract Enclosed |
| | AB1 | 57-155793 A | 09/1982 | JP | | | Abstract Enclosed |
| | AC1 | 62-119196 A | 05/1987 | JP | | | Abstract Enclosed |
| | AD1 | 62-165948 A | 07/1987 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE1 | Ando, T.,"Self-Consistent Results for a GaAs/$Al_xGa_{1-x}As$ Heterojunction. I. Subband Structure and Light Scattering Spectra", *J. Phys. Soc. Jpn. 51*, pp. 3893-3899 (1982). |
| | AF1 | Ando, T., " Self-Consistent Results for a GaAs/$Al_xGa_{1-x}As$ Heterojunction. II. Low Temperature Mobility", *J. Phys. Soc. Jpn. 51*, pp. 3900-3907 (1982). |
| | AG1 | Ando, T. and Mori, S., "Effective-Mass Theory of Semiconductor Heterojunctions and Superlattices," *Surf. Sci. 113*, pp. 124-130 (1982). |
| | AH1 | Hedin, L. and Lundqvist, B.I., "Explicit local exchange-correlation potentials," *J. Phys. C: Solid St. Phys.*, Vol. 4, pp. 2064-2082 (1971). |
| | AI1 | Ploog, K., "Molecule Beam Epitaxy of Artificially Layered III-V Semiconductors: Ultrathin-Layer $(GaAs)_m(AlAs)_m$ Superlattices and Delta (δ-) Doping in GaAs", *Physica Scripta*, Vol. T19, pp. 136-146 (1987). |
| | AJ1 | Ploog, K., "Delta- (δ-) Doping In MBE-Grown GaAs: Concept and Device Application," *Journal of Crystal Growth 81*, North-Holland, pp. 304-313 (1987). |
| | AK1 | Ogawa, M. and Baba, T., "Heavily Si-Doped GaAs and AlAs/n-GaAs Superlattice Grown by Molecular Beam Epitaxy," *Japanese Journal of Applied Physics*, Vol. 24, No. 8, pp. L572-L574 (August 1995). |

| EXAMINER | DATE CONSIDERED |
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|---|---|---|---|---|---|---|---|
| | AA2 | 63-188977 A | 08/1988 | JP | | | Abstract Enclosed |
| | AB2 | 63-222488 A | 09/1988 | JP | | | Abstract Enclosed |
| | AC2 | 63-222489 A | 09/1988 | JP | | | Abstract Enclosed |
| | AD2 | 1-14717 B2 | 03/1989 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE2 | Sasa, S. *et al.*, "Si Atomic-Planar-Doping in GaAs Made by Molecular Beam Epitaxy," *Japanese Journal of Applied Physics*, Vol. 24, No. 8, pp. L602-L604 (August 1995). |
| | AF2 | Yao, T. *et al.*, "The effects of substrate temperature on the donor ionization energy and on the material properties of selectively doped short-period GaAs:Si/AlAs superlattices," *J. Appl. Phys. 62(5)*, American Institute of Physics, pp. 1925-1930 (September 1, 1987). |
| | AG2 | Horikoshi, Y. *et al.*, "High-Mobility Two-Dimensional Electron Gas from Delta-Doped Asymmetric $Al_xGa_{1-x}As/GaAs/Al_yGa_{1-y}As$ Quantum Wells," *Japanese Journal of Applied Physics*, Vol. 26, No. 2, pp. 263-266 (February 1987). |
| | AH2 | Ploog, K. *et al.*, "Improved electron mobility by AlAs spacer in one-sided selectively doped $Al_xGa_{1-x}As/GaAs$ multiple quantum well heterostructures," *Appl. Phys. Lett. 50 (18)*, American Institute of Physics, pp. 1237-1239 (May 4, 1987). |
| | AI2 | Ploog, K., "GaAs Doping Superlattices A New Class of Semiconductor Materials Grown by Molecular Beam Epitaxy," *Collected Paper of MBE-CST-2*, Tokyo, pp. 17-20 (1982). |
| | AJ2 | Theis, T.N. and Wright, S.L., "Origin of 'residual' persistent photoconductivity in selectively doped $GaAs/Al_xGa_{1-x}As$ heterojunctions," *Appl. Phys. Lett. 48 (20)*, American Institute of Physics, pp. 1374-1376 (May 19, 1986). |
| | AK2 | Hiyamizu, S. *et al.*, "A New Heterostructure for 2DEG System with a Si Atomic-Planar-Doped AlAs-GaAs-AlAs Quantum Well Structure Grown by MBE," *Japanese Journal of Applied Physics*, Vol. 24, No. 6, pp. L431-L433 (June 1985). |

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| FORM PTO-1449<br>FIFTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT | ATTY. DOCKET NO.<br>2005.0020003 | APPLICATION NO.<br>09/604,097 |
|---|---|---|
| | APPLICANTS<br>Yukio SHAKUDA | |
| | FILING DATE<br>June 27, 2000 | GROUP<br>2828 |

**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA3 | 1-204425 A | 08/1989 | JP | | | Abstract Enclosed |
| | AB3 | 2-229476 A | 09/1990 | JP | | | Abstract Enclosed |
| | AC3 | 2-291125 A | 11/1990 | JP | | | Abstract Enclosed |
| | AD3 | 3-80198 A | 04/1991 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE3 | Baba, T. *et al.*, "AlAs/*n*-GaAs superlattice and its application to high-quality two-dimensional electron gas systems," *J. Appl. Phys. 59 (2)*, American Institute of Physics, pp. 526-532 (January 15, 1986). |
| | AF3 | Street, R.A. *et al.*, "Luminescence of *n-i-p-i* heterostructures," *Physical Review B*, Vol. 33, No. 10, pp. 7043-7046 (May 15, 1986). |
| | AG3 | Schubert, E.F. and Ploog, K., "Interpretation of Capacitance-Voltage Profiles from Delta-Doped GaAs Grown by Molecular Beam Epitaxy," *Japanese Journal of Applied Physics*, Vol. 25, No. 7, pp. 966-970 (July 1986). |
| | AH3 | Nishikawa, Y. *et al.*, "MOCVD Growth Of InGaAlP Using Ethyldimethylindium As An In Source And Application To Visible-Region Lasers," *Journal of Crystal Growth 104*, Elsevier Science Publsihers B.V., pp. 245-249 (1990). |
| | AI3 | Miller, L.M. *et al.*, "Characteristics of step-graded separate confinement quantum well lasers with direct and indirect barriers," *J. Appl. Phys. 68 (5)*, American Institute of Physics, pp. 1964-1967 (September 1, 1990). |
| | AJ3 | Sawada, T. and Majerfeld, A., "Carrier Concentration and Composition Profiling for GaAs/AlGaAs Laser Diodes," *Bulletin of the Faculty of Engineering*, Hokkaido University, No. 133, pp. 59-72 (1986). |
| | AK3 | LePore, J.J., "An improved technique for selective etching of GaAs and $Ga_{1-x}Al_xAs$," *J. Appl. Phys. 51 (12)*, American Institute of Physics, pp. 6441-6442 (December 1980). |

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|---|---|---|---|---|---|---|---|
| | AA4 | 3-31678 B2 | 05/1991 | JP | | | Abstract Enclosed |
| | AB4 | 3-252176 A | 11/1991 | JP | | | Abstract Enclosed |
| | AC4 | 3-252177 A | 11/1991 | JP | | | Abstract Enclosed |
| | AD4 | 3-252178 A | 11/1991 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

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|---|---|---|
| | AE4 | Sandroff, C.J. *et al.*, "Dramatic enhancement in the gain of a GaAs/AlGaAs heterostructure bipolar transistor by surface checmical passivation," *Appl. Phys. Lett. 51 (1)*, American Institute of Physics, pp. 33-35 (July 6, 1987). |
| | AF4 | Takado, N. *et al.*, "Chemically enhanced focused ion beam etching of deep grooves and laser-mirror facets in GaAs under $Cl_2$ gas irradiation using a fine nozzle," *Appl. Phys. Lett. 50(26)*, American Institute of Physics, pp. 1891-1893 (June 29, 1987). |
| | AG4 | Ohba, Y. and Hatano, A., "H-Atom Incorporation in Mg-Doped GaN Grown by Metalorganic Chemical Vapor Deposition," *Jpn. J. Appl. Phys.*, Vol. 33, Part 2, No. 10A, pp. L1367-L1369 (October 1, 1994). |
| | AH4 | Olszakier, M. *et al.*, "Photoinduced Intersubband Absorption in Undoped Multi-Quantum-Well Structures," *Physical Review Letters*, Vol. 62, No. 25, pp. 2997-3000 (June 19, 1989). |
| | AI4 | Seilmeier, A. *et al.*, "Direct Observation of Intersubband Relaxation in Narrow Multiple Quantum Well Structures," *Solid-State Electronics*, Vol. 31, No. ¾, Pergamon Journals Ltd., pp. 767-770 (1988). |
| | AJ4 | Yang, C. and Pan, D., "Intersubband absorption of silicon-based quantum wells for infrared imaging," *J. Appl. Phys. 64(3)*, American Institute of Physics, pp. 1573-1575 (August 1, 1988). |
| | AK4 | Andersson, J.Y. and Landgren, G., "Intersubband transitions in single AlGaAs/GaAs quantum wells studied by Fourier transform infrared spectroscopy," *J. Appl. Phys. 64(8)*, American Institute of Physics, pp. 4123-4127 (October 15, 1988). |

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA5 | 4-10665 A | 01/1992 | JP | | | Abstract Enclosed |
| | AB5 | 4-15200 B2 | 03/1992 | JP | | | Abstract Enclosed |
| | AC5 | 4-163968 A | 06/1992 | JP | | | Abstract Enclosed |
| | AD5 | 4-163970 A | 06/1992 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE5 | Goldberg, B.B. *et al.*, "Inelastic Light Scattering Of Valence Subband Transitions In GaAs/GaAlAs Multiple Quantum Wells," *Surface Science 196*, Elsevier Science Publishers B.V., pp. 619-625 (1988). |
| | AF5 | Julien, F.H. *et al.*, "Optical saturation of intersubband absorption in GaAs-$Al_xGa_{1-x}As$ quantum wells," *Appl. Phys. Lett. 53(2)*, American Institute of Physics, pp. 116-118 (July 11, 1988). |
| | AG5 | Goossen, K.W. *et al.*, "Conduction-band offset determination in GaAs-$Al_xGa_{1-x}As$ through measurement of infrared internal photoemission," *Physical Review B*, Vol. 36, No. 17, The American Physical Society, pp. 9370-9373 (December 15, 1987). |
| | AH5 | Kastalsky, A. *et al.*, "Photovoltaic detection of infrared light in a GaAs/AlGaAs superlattice," *Appl. Phys. Lett. 52(16)*, American Institute of Physics, pp. 1320-1322 (April 18, 1988). |
| | AI5 | Bäuerle, R.J. *et al.*, "Picosecond infrared spectroscopy of hot carriers in a modulation-doped $Ga_{0.47}In_{0.53}As$ multiple-quantum-well structure," *Physical Review B*, Vol. 38, No. 6, The American Physcial Society, pp. 4307-4310 (August 15, 1988). |
| | AJ5 | Seilmeier, A. *et al.*, "Intersubband Relaxation in GaAs-$Al_xGa_{1-x}As$ Quantum Well Structures Observed Directly by an Infrared Bleaching Techniques," *Physical Review Letters*, Vol. 59, No. 12, The American Physical Society, pp. 1345-1348 (September 21, 1987). |
| | AK5 | Abstreiter, G. *et al.*, "Electronic Excitations In Narrow GaAs/$Al_xGa_{1-x}As$ Quantum Well Structures," *Surface Sciences 196*, Elsevier Science Publishers B.V., pp. 613-618 (1988). |

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|---|---|---|---|---|---|---|---|
| | AA6 | 4-163971 A | 06/1992 | JP | | | Abstract Enclosed |
| | AB6 | 4-164895 A | 06/1992 | JP | | | Abstract Enclosed |
| | AC6 | 4-170390 A | 06/1992 | JP | | | Abstract Enclosed |
| | AD6 | 4-247637 A | 09/1992 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE6 | Seilmeier, A. *et al.*, "Picosecond Intersubband Spectroscopy," *Superlattices and Microstructures*, Vol. 5, No. 4, Academic Press Limited, pp. 569-574 (1989). |
| | AF6 | Kane, M.J. *et al.*, "Intersubband Absorption and Infrared Modulation in GaAs/AlGaAs Single Quantum Wells," *Superlattices and Microstructures*, Vol. 5, No. 4, Academic Press Limited, pp. 587-589 (1989). |
| | AG6 | Asai, H. *et al.*, "Structure Dependence of Intersubband Absorption in InGaAs/InAlAs Multiquantum Wells," 6 pages. |
| | AH6 | Zhou, X. *et al.*, "Intersubband absorption in strained $In_xGa_{1-x}As/Al_{0.4}Ga_{0.6}As(0\leq x\leq 0.15)$ multiquantum wells," *Appl. Phys. Lett. 54(9)*, American Institute of Physics, pp. 855-856 (February 27, 1989). |
| | AI6 | Rosencher, E. *et al.*, "Observation of nonlinear optical rectification at 10.6 μm in compositionally asymmetrical AlGaAs multiquantum wells," *Appl. Phys. Lett. 55(16)*, American Institute of Physics, pp. 1597-1599 (October 16, 1989). |
| | AJ6 | Fejer, M.M. *et al.*, "Observation of Extremely Large Quadratic Susceptibility at 9.6–10.8 μm in Electric-Field-Biased AlGaAs Quantum Wells," *Physical Review Letters*, Vol. 62, No. 9 The American Physical Society, pp. 1041-1044(February 27, 1989). |
| | AK6 | Walrod, D. *et al.*, "Optical nonlinearities due to subband structures in $Al_{0.08}In_{0.92}Sb$/InSb superlattices," *Appl. Phys. Lett. 56(3)*, American Institute of Physics, pp. 218-220 (January 15, 1990). |

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|---|---|---|---|---|---|---|---|
| | AA7 | 4-273175 A | 09/1992 | JP | | | Abstract Enclosed |
| | AB7 | 4-297023 A | 10/1992 | JP | | | Abstract Enclosed |
| | AC7 | 4-321279 A | 11/1992 | JP | | | Abstract Enclosed |
| | AD7 | 4-321280 A | 11/1992 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE7 | Kinch, M.A. and Yariv, A., "Performance limitations of GaAs/AlGaAs infrared superlattices," *Appl. Phys. Lett. 55 (2)*, American Institute of Physics, pp. 2093-2095 (November 13, 1989). |
| | AF7 | West, L.C. and Eglash, S.J., "First observation of an extremely large-dipole infrared transition within the conduction band of a GaAs quantum well," *Appl. Phys. Lett. 46(12)*, American Instititute of Physics, pp. 1156-1158 (June 15, 1985). |
| | AG7 | Nakayama, M. *et al.*, "Intersubband transitions in GaAs-$Al_xGa_{1-x}As$ modulation-doped superlattices," *Appl. Phys. Lett. 51(21)*, American Institute of Physics, pp. 1741-1743 (November 23, 1987). |
| | AH7 | Allmen, P.v. *et al.*, "Intersubband Absorption In GaAs/AlGaAs Quantum Wells Between 4.2K and Room Temperature," *Superlattics and Microstructures*, Vol. 5, No. 2, Academic Press Limited, pp. 259-263 (1989) |
| | AI7 | Mii, Y.J. *et al.*, "Growth and characterization of doped GaAs/AlGaAs multiple quantum well structures on Si substrates for infrared detection," *J. Vac. Sci. Tecnhol. B 7(2)*, American Vacuum Society, pp. 341-344 (March/April 1989). |
| | AJ7 | Lobentanzer, H. *et al.*, "Intersubband absorption in a modulation-doped $Ga_{0.47}In_{0.53}As/Al_{0.48}In_{0.52}As$ multiple quantum well structure," *Appl. Phys. Lett. 53(7)*, American Institute of Physics, pp. 571-573 (August 15, 1988). |
| | AK7 | Elsnesser, T. *et al.*, "Picosecond Infrared Spectroscopy of Hot Carriers in a Modulation-Doped $Ga_{0.47}In_{0.53}As$ Multiple-Quantum-Well Structure," pp. 388-389 (July 19, 1988). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA8 | 5-21845 A | 01/1993 | JP | | | Abstract Enclosed |
| | AB8 | 5-21846 A | 01/1993 | JP | | | Abstract Enclosed |
| | AC8 | 5-63236 A | 03/1993 | JP | | | Abstract Enclosed |
| | AD8 | 5-74710 A | 03/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE8 | Oberli, D.Y. *et al.*, "Intersubband Relaxation of Photoexcited Hot Carriers In Quantum Wells," *Solid-State Electronics*, Vol. 31, No. ¾, Pergamon Journals Ltd., pp. 413-418 (1988). |
| | AF8 | Asai, H. *et al.*, "[LN-3] 3.2 μm Intersubband Absorption In Strained InGaAs/InAlAs Multiquantum Wells," p. 8. |
| | AG8 | Olszakier, M. *et al.*, "Intersubband Spectroscopy In *GaAs/GaAlAs* Multi-Quantum-Well Structures: Photoinduced Absorption," *Superlattices and Microstructures*, Vol. 5, No. 5, Academic Press Limited, pp. 283-286 (1989). |
| | AH8 | Ahn, D. and Chuang, S.L., "Electric-Field Dependence of the Intersubband Optical Absorption in a Semiconductor Quantum Well," *Superlattices and Microstructures*, Vol. 4, No. 2, Academic Press Limited, pp. 153-157 (1988). |
| | AI8 | Ahn, D. ad Chuang, S.L., "Calculation of Linear and Nonlinear Intersubband Optical Absorptions in a Quantum Well Model with an Applied Electric Field," *IEEE Journal of Quantum Electronics*, Vol. QE-23, No. 12, IEEE, pp. 2196-2204 (December 1987). |
| | AJ8 | Newson, D.J. and Kurobe, A., "Possiblity of optical bistability due to resonant intersubband excitation in stepped modulation-doped quantum wells," *Appl. Phys. Lett. 51(21)*, American Institute of Physics, pp. 1670-1672 (November 23, 1987). |
| | AK8 | Bandara, K.M.S.V. *et al.*, "Exchange interactions in quantum well subbands," *Appl. Phys. Lett. 53(20)*, American Institute of Physics, pp. 1931-1933 (November 14, 1988). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA9 | 5-109621 A | 04/1993 | JP | | | Abstract Enclosed |
| | AB9 | 5-110139 A | 04/1993 | JP | | | Abstract Enclosed |
| | AC9 | 5-121327 A | 05/1993 | JP | | | Abstract Enclosed |
| | AD9 | 5-129656 A | 05/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE9 | Luryi, S., "Photon-Drag Effect in Intersubband Absorption by a Two-Dimenstional Electron Gas," *Physical Review Letters*, Vol. 58, No. 21, The American Physical Society, pp. 2263-2266 (May 25, 1987). |
| | AF9 | Yuh, P.F. and Wang, K.L., "Novel infrared band-aligned superlattice laser," *Appl. Phys. Lett. 51(18)*, American Institute of Physics, pp. 1404-1406 (November 2, 1987). |
| | AG9 | Newson, D.J. and Kurobe, A., "Simulation of Saturation and Relaxation of Intersubband Absorption in Doped Quantum Wells," *IQEC '88*, pp. 46-47. |
| | AH9 | Newson, D.J. and Kurobe, A., "Optical Nonlinearity Due to Resonant Intersubband Transitions in Doped Quantum Wells," *Nonlinear Optics of Organics and Semiconductors*, 8 pages. |
| | AI9 | Newson, D.J. and Kurobe, A., "The effect of conduction band non-parabolicity on inter-sub-band absorption in doped quantum wells," *Semicond. Sci. Technol. 3*, IOP Publishing Ltd., pp. 786-790 (1988). |
| | AJ9 | Gomes, V.M.S. *et al.*, "Intersubband Transition Energies in Quantum Wells in *n*-Type GaAs-$Al_xGA_{1-x}As$ Heterostructures," *International Journal of Quantum Chemistry*, Vol. XXXII, John Wiley & Sons, Inc., pp. 655-661 (1987). |
| | AK9 | Tsang, L. *et al.*, "Electric field control of optical second-harmonic generation in a quantum well," *Appl. Phys. Lett. 52(9)*, American Institute of Physics, pp. 697-699 (February 29, 1988). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA10 | 5-160437 A | 06/1993 | JP | | | Abstract Enclosed |
| | AB10 | 5-166923 A | 07/1993 | JP | | | Abstract Enclosed |
| | AC10 | 5-175124 A | 07/1993 | JP | | | Abstract Enclosed |
| | AD10 | 5-183189 A | 07/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE10 | Ahn, D. and Chuang, S.L., "Nonlinear intersubband optical absorption in a quantum well with an applied electric field," abstract from the October 18-23, 1997 Annual Meeting of the Optical Society of America, 1 page. |
| | AF10 | Yoo, S.J.B. *et al.*, "Second harmonic generation in dc-biased quantum wells," abstract from the October 18-23, 1997 Annual Meeting of the Optical Society of America, 1 page. |
| | AG10 | Ahn, D. and Chuang, S.L., "Intersubband optical absorption in a quantum well with an applied electric field," *Physical Review B*, Vol. 35, No. 8, The American Physical Society, pp. 4149-4151 (March 15, 1987). |
| | AH10 | Anderson, N.G. *et al.*, "Optical characterization of pseudomorphic $In_xGa_{1-x}As$-GaAs single-quantum-well heterostructures," *J. Appl. Phys. 60(7)*, pp. 2361-2367 (October 1, 1986). |
| | AI10 | Ji, G. *et al.*, "Optical investigation of highly strained InGaAs-GaAs multiple quantum wells," *J. Appl. Phys. 62(8)*, American Institute of Physics, pp. 3366-3373 (October 15, 1987). |
| | AJ10 | Arent, D.J. *et al.*, "Strain effects and band offsets in GaAs/InGaAs strained layered quantum structures," *J. Appl. Phys. 66(4)*, American Institute of Physics, pp. 1739-1747 (August 15, 1989). |
| | AK10 | Yu, P.W. *et al.*, "Photocurrent spectroscopy of $In_xGa_{1-x}As$/GaAs multiple quantum wells," *Appl. Phys. Lett. 54(22)*, American Institute of Physics, pp. 2230-2232 (May 29, 1989). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA11 | 5-190900 A | 07/1993 | JP | | | Abstract Enclosed |
| | AB11 | 5-190903 A | 07/1993 | JP | | | Abstract Enclosed |
| | AC11 | 5-206520 A | 08/1993 | JP | | | Abstract Enclosed |
| | AD11 | 5-211347 A | 08/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE11 | Watson, R.F. *et al.*, "Shattering The Quartz Muffle Myth," pp. 194-202. |
| | AF11 | Bertolet, D.C. *et al.*, "Pseudomorphic GaAs/InGaAs single quantum wells by atmospheric pressure organometallic chemical vapor deposition," *Appl. Phys. Lett. 52(4)*, American Institute of Physics, pp. 293-295 (January 25, 1988). |
| | AG11 | Quillec, M. *et al.*, "Growth conditions and characterization of InGaAs/GaAs strained layers superlattices," *J. Appl. Phys. 55(8)*, American Institute of Physics, pp. 2904-2909 (April 15, 1984). |
| | AH11 | Niki, S. *et al.*, "Band-edge discontinuities of strained-layer $In_xGa_{1-x}As/GaAs$ heterojunctions and quantum wells," *Appl. Phys. Lett. 55(13)*, American Institute of Physics, pp. 1339-1341 (September 25, 1989). |
| | AI11 | Marzin, J.-Y. *et al.*, "Optical investigation of a new type of valence-band configuration in $In_xGa_{1-x}As$-GaAs strained superlattices," *Physical Review B*, Vol. 31, No. 12, The American Physical Society, pp. 8298-8301 (June 15, 1985). |
| | AJ11 | Menéndez, J. *et al.*, "Large valence-band offset in strained-layer $In_xGa_{1-x}As$-GaAs quantum wells," *Phsycial Review B*, Vol. 36, No. 15, pp. 8165-8168 (November 15, 1987). |
| | AK11 | Liu, C.T. *et al.*, "Cyclotron resonance measurements of electron effective mass in strained AlGaAs/InGaAs/GaAs pseudomorphic structures," *Appl. Phys. Lett. 53(25)*, American Institute of Physics, pp. 2510-2512 (December 19, 1988). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA12 | 5-243613 A | 09/1993 | JP | | | Abstract Enclosed |
| | AB12 | 5-73252 B2 | 10/1993 | JP | | | Abstract Enclosed |
| | AC12 | 5-291621 A | 11/1993 | JP | | | Abstract Enclosed |
| | AD12 | 5-308154 A | 11/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE12 | Suemune, I. *et al.*, "Extremely wide modulation bandwidth in a low threshold current strained quantum well laser," *Appl. Phys. Lett. 53(15)*, American Institute of Physics, pp. 1378-1380 (October 10, 1988). |
| | AF12 | Priester, C. *et al.*, "Theoretical calculation of band-edge discontinuities near a strained heterojunction: Application to (In,Ga)As/GaAs" *Physical Review B*, Vol. 38, No. 14, The American Physical Society, pp. 9870-9873 (November 15, 1988). |
| | AG12 | Andersson, T.G. *et al.*, "Photoluminescence and photoconductivity measurements on band-edge offsets in strained molecular-beam-epitaxy-grown $In_xGa_{1-x}As/GaAs$ quantum wells," *Physical Review B*, Vol. 37, No. 8, The American Physical Society, pp. 4032-4038 (March 15, 1988). |
| | AH12 | Sato, M. and Horikoshi, Y., "Photoluminescence from InGaAs-GaAs strained-layer superlattices grown by flow-rate modulation epitaxy," *Appl. Phys. Lett. 52(2)*, American Institute of Physics, pp. 123-125 (January 11, 1988). |
| | AI12 | Scott, E.G. *et al.*, "Improvements to and characterization of GaInAs/AlInAs heterointerfaces grown by molecular-beam epitaxy," *J. Vac. Sci. Technol. B 6(2)*, American Vacuum Society, pp. 603-606 (March/April 1988). |
| | AJ12 | Peng, C.K. *et al.*, "Extremely low nonalloyed and alloyed contact resistance using an InAs cap layer on InGaAs by molecular-beam epitaxy," *J. Appl. Phys. 64(1)*, American Institute of Physics, pp. 429-431 (July 1, 1988). |
| | AK12 | Jeong, J. *et al.*, "An investigation of $In_xGa_{1-x}As/GaAs$ quantum wells grown by molecular-beam epitaxy," *J. Appl. Phys. 63(11)*, American Institute of Physics, pp. 5464-5468 (June 1, 1988). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA13 | 5-308155 A | 11/1993 | JP | | | Abstract Enclosed |
| | AB13 | 5-308156 A | 11/1993 | JP | | | Abstract Enclosed |
| | AC13 | 5-315646 A | 11/1993 | JP | | | Abstract Enclosed |
| | AD13 | 5-343741 A | 12/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE13 | Yao, J.Y. *et al.*, "Structure of lattice-strained $In_xGa_{1-x}As/GaAs$ layers studied by transmission electron microscopy," *Appl. Phys. Lett. 53(15)*, American Institute of Physics, pp. 1420-1422 (October 10, 1988). |
| | AF13 | Bedair, S.M. *et al.*, "Defect reduction in GaAs grown by molecular beam epitaxy using different superlattice structures," *Appl. Phys. Lett. 49(15)*, American Institute of Physics, pp. 942-944 (October 13, 1986). |
| | AG13 | Coronado, M. L. *et al.*, "Indium Isoelectronic Doping Influence on Etch Pit Density in GaAs Layers Grown by Vapour Phase Epitaxy," *Japanese Journal of Applied Physics*, Vol. 25, No. 11, pp. L899-L901 (November 1986). |
| | AH13 | Wood, C.E.C. *et al.*, "State-of-the-art AlGaAs alloys by antimony doping," *J. Appl. Phys. 60(4)*, American Institute of Physics, pp. 1300-1305 (August 15, 1986). |
| | AI13 | Missous, M. *et al.*, "Electrical Properties of Indium Doped GaAs Layers Grown by MBE," *Journal of Crystal Growth 81*, Elsevier Science Publishers B.V., pp. 314-318 (1987). |
| | AJ13 | Das, U. *et al.*, "Low-loss optical waveguides made with molecular beam epitaxial $In_{0.012}Ga_{0.988}As$ and $In_{0.2}Ga_{0.8}As$-GaAs superlattices," *Appl. Phys. Lett. 48(22)*, American Institute of Physics, pp. 1507-1509 (June 2, 1986). |
| | AK13 | Beneking, H. *et al.*, "High quality epitaxial GaAs and InP wafers by isoelectronic doping," *Appl. Phys. Lett. 47(8)*, American Institute of Physics, pp. 828-830 (October 15, 1985). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA14 | 5-343742 A | 12/1993 | JP | | | Abstract Enclosed |
| | AB14 | 6-9257 B2 | 02/1994 | JP | | | Abstract Enclosed |
| | AC14 | 6-9258 B2 | 02/1994 | JP | | | Abstract Enclosed |
| | AD14 | 6-29574 A | 02/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE14 | Bhattacharya, P.K. *et al.*, "Low defect densities in molecular beam epitaxial GaAs achieved by isoelectronic In doping," *Appl. Phys. Lett. 49(8)*, American Institute of Physics, pp. 470-472 (August 25, 1986). |
| | AF14 | Beneking, H. and Emeis, N., "Minority Carrier Lifetime Improvement by Single Strained Layer Epitaxy of InP," *IEEE Electron Device Letters*, Vol. EDL-7, No. 2, IEEE, pp. 98-100 (February 1986). |
| | AG14 | Narozny, P. and Beneking, H., "High-Quality GaAs Schottky Diodes Fabricated By Strained Layer Epitaxy," *Electronics Letters*, Vol. 21, No. 22, pp. 1050-1051 (October 24, 1985). |
| | AH14 | Beneking, H. *et al.*, "Enhanced Carrier Lifetime and Diffusion Length in GaAs by Strained-Layer MOCVD," *IEEE Electron Device Letters*, Vol. EDL-7, No. 2, IEEE, pp. 101-103 (February 1986). |
| | AI14 | Andersson, T.G. *et al.*, "Variation of the critical layer thickness with In content in strained $In_xGa_{1-x}As$-GaAs quantum wells grown by molecular beam epitaxy," *Appl. Phys. Lett. 51(10)*, American Institute of Physics, pp. 752-754 (September 7, 1987). |
| | AJ14 | Fritz, I.J. *et al.*, "Critical layer thickness in $In_{0.2}Ga_{0.8}As$/GaAs single strained quantum well structures," *Appl. Phys. Lett. 51(13)*, American Institute of Physics, pp. 1004-1006 (September 28, 1987). |
| | AK14 | Gourley, P.L. *et al.*, "Controversy of critical layer thickness for InGaAs/GaAs strained-layer epitaxy," *Appl. Phys. Lett. 52(5)*, American Institute of Physics, pp. 377-379 (February 1, 1988). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA15 | 6-14564 B2 | 02/1994 | JP | | | Abstract Enclosed |
| | AB15 | 6-69543 A | 03/1994 | JP | | | Abstract Enclosed |
| | AC15 | 6-97493 A | 04/1994 | JP | | | Abstract Enclosed |
| | AD15 | 6-97494 A | 04/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE15 | Joyce, M.J. *et al.*, "Concentration-dependent band offset in $In_xGa_{1-x}As/GaAs$ strained quantum wells," *Physical Review B*, Vol. 38, No. 15, The American Physical Society, pp. 10978-10980 (November 15, 1988). |
| | AF15 | Laurich, B.K. *et al.*, "Study of the Optical Properties of (100) and (111) Oriented GaInAs/GaAs Strained-Layer Superlattices," 12 pages (appears to be dated August 9, 1988). |
| | AG15 | Raymond, A. *et al.*, "The electron effective mass in heavily doped GaAs," *J. Phys. C: Solid State Phys.*, Vol. 12, The Institute of Physics, pp. 2289-2293 (1979). |
| | AH15 | Bandara, K.M.S.V. *et al.*, "Erratum: Exchange interactions in quantum well subbands [Appl. Phys. Lett. 53, 1931 (1988)]," *Appl. Phys. Lett. 55(2)*, American Institute of Physics, p. 206 (July 10, 1989). |
| | AI15 | Nelson, D.F. *et al.*, "Band nonparabolicity effects in semiconductor quantum wells," *Physical Review B*, Vol. 35, No.14, pp. 7770-7773 (May 15, 1987). |
| | AJ15 | Nelson, D.F. *et al.*, "Exciton binding energies from an envelope-function analysis of data on narrow quantum wells of integral monolayer widths in $Al_{0.4}Ga_{0.6}As/GaAs$," *Physical Review B*, Vol. 36, No. 1, pp. 8063-8070 (November 15, 1987). |
| | AK15 | Yoo, K.H. *et al.*, "Effect of nonparabolicity in $GaAs/Ga_{1-x}Al_xAs$ semiconductor quantum wells," *Physical Review B*, Vol. 39, No. 17, The American Physical Society, pp. 12808-12813 (June 15, 1989). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA16 | 6-97495 A | 04/1994 | JP | | | Abstract Enclosed |
| | AB16 | 6-97496 A | 04/1994 | JP | | | Abstract Enclosed |
| | AC16 | 6-125113 A | 05/1994 | JP | | | Abstract Enclosed |
| | AD16 | 6-151962 A | 05/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE16 | Bastard, G., "Theoretical investigations of superlattice band structure in the envelope-function approximation," *Physical Review B*, Vol. 25, No. 12, The American Physical Society, pp. 7584-7597 (June 15, 1982). |
| | AF16 | Oing, Y. and Chu-liang, Y., "The effect of complex band structure and non-parabolicity on sub-bands of GaAs-$Al_xGa_{1-x}As$ heterostructures: band offset," *J. Phys. C: Solid State Phys. 20*, IOP Publishing Ltd., pp. 5125-5134 (1987). |
| | AG16 | Bastard, G., "Superlattice band structure in the envelope-function approximation," *Physical Review B*, Vol. 24, No. 10, The American Physical Society, pp. 5693-5697 (November 15, 1981). |
| | AH16 | Dingle, R., "Confined Carrier Quantum States in Ultrathin Semiconductor Heterostructures," pp. 21-48. |
| | AI16 | Shakuda, Y. and Katahama, H., "Intersubband Absorption in $In_{0.15}Ga_{0.85}As/Al_{0.35}Ga_{0.65}As$ Multiple Quantum Wells", *Japanese Journal of Applied Physics*, Vol. 29, No. 4, pp. L552-L555 (April 1990). |
| | AJ16 | Lin, M.E. *et al.*, "Low resistance ohmic contacts on wide band-gap GaN," *Appl. Phys. Lett. 64(8)*, American Institute of Physics, pp. 1003-1005 (February 21, 1994). |
| | AK16 | *Nichia Product Guide: NSPB Series (Blue)/NSPG Series (Green)/ NSPW Series (White)*, Nichia Chemical Industries, Ltd., 6 pages. |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA17 | 6-151963 A | 05/1994 | JP | | | Abstract Enclosed |
| | AB17 | 6-151964 A | 05/1994 | JP | | | Abstract Enclosed |
| | AC17 | 6-151965 A | 05/1994 | JP | | | Abstract Enclosed |
| | AD17 | 6-151966 A | 05/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE17 | Klaasen, J.J. *et al.*, "High Temperature GaN and $Al_xGa_{1-x}N$ Photovoltaic Detectors fr UV Sensing Applications," 2 pages. |
| | AF17 | Khan, M.A. *et al.*, "Metal semiconductor field effect transistor based on single crystal GaN," *Appl. Phys. Lett. 62(15)*, American Institute of Physics, pp. 1786-1787 (April 12, 1993). |
| | AG17 | Nakamura, S., "InGaN/AlGaN blue-light-emitting diodes," *J. Vac. Sci. Technol. A 13(3)*, American Vacuum Society, pp. 705-710 (May/June 1995). |
| | AH17 | Suzuki, M. and Uenoyama, T., "First-principles calculations of effective-mass parameters of AlN and GaN," *Physical Review B*, Vol. 52, No. 11, The American Physical Society, pp. 8312-8139 (September 15, 1995). |
| | AI17 | Uenoyama, T. and Suzuki, M., "Valence subband structures of wurtzite GaN/AlGaN quantum wells," *Appl. Phys. Lett. 67 (17)*, American Institute of Physics, pp. 2527-2529 (October 23, 1995). |
| | AJ17 | Hartman, R.L. *et al.*, "Pulsations and absorbing defects in (Al, Ga)As injection lasers," *J. Appl. Phys. 50(7)*, American Institute of Physics, pp. 4616-4619 (July 1979). |
| | AK17 | Tsang, W.T., "The influence of bulk nonradiative recombination in the wide band-gap regions of moleular beam epitaxially grown GaAs-$Al_xGa_{1-x}As$ DH lasers," *J. Appl. Phys. 33(3)*, American Institute of Physics, pp. 245-248 (August 1, 1978). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA18 | 6-151967 A | 05/1994 | JP | | | Abstract Enclosed |
| | AB18 | 6-151968 A | 05/1994 | JP | | | Abstract Enclosed |
| | AC18 | 6-152072 A | 05/1994 | JP | | | Abstract Enclosed |
| | AD18 | 6-164058 A | 06/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE18 | Chinone, N. *et al.*, "Mode-Hopping Noise in Index-Guided Semiconductor Lasers and Its Reduction by Saturable Absorbers," *IEEE Journal of Quantum Electronics*, Vol. QE-21, No. 8, IEEE, pp. 1264-1270 (August 1985). |
| | AF18 | Fukui, T. and Horikoshi, Y., "Organometallic VPE Growth of $InAs_{1-x}Sb_x$ on InAs," *Japanese Journal of Applied Physics*, Vol. 19, No. 1, pp. L53-L56 (January 1980). |
| | AG18 | Misawa, S. *et al.*, "Influence of Ga Sources on Impurity Doping in Gas Source MBE GaAs," *Japanese Journal of Applied Physics*, Vol. 26, No. 7, pp. 1088-1091 (July 1987). |
| | AH18 | Tsang, W.T., "Very low current threshold $GaAs/Al_{0.5}Ga_{0.5}As$ double-heterostructure lasers grown by chemical beam epitaxy," *Appl. Phys. Lett. 48(8)*, American Institute of Physics, pp. 511-513 (February 24, 1986). |
| | AI18 | Tsang, W.T. *et al.*, "Doping studies using thermal beams in chemical-beam epitaxy," *Appl. Phys. Lett. 60(12)*, American Institute of Physics, pp. 4182-4185 (December 15, 1986). |
| | AJ18 | Nakata, N., "Mass Production Of AlGaAs Laser Diode Enabled By Molecular Beam Epitaxy Method," *JEE*, pp. 38-40 (August 1988). |
| | AK18 | Yamamoto, S. and Hijikata, T., "Continuous control of coherence length in separately pumped (AlGa)As lasers," *Appl. Phys. Lett. 49(18)*, American Institute of Physics, pp. 1129-1131 (November 3, 1986). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA19 | 6-177059 A | 06/1994 | JP | | | Abstract Enclosed |
| | AB19 | 6-196755 A | 07/1994 | JP | | | Abstract Enclosed |
| | AC19 | 6-196757 A | 07/1994 | JP | | | Abstract Enclosed |
| | AD19 | 6-209120 A | 07/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE19 | Yonezu, H. *et al.*, "A GaAs-$Al_xGa_{1-x}As$ Double Heterostructure Planar Stripe Laser," *Japanese Journal of Applied Physics*, Vol. 12, No. 10, pp. 1585-1592 (October 1973). |
| | AF19 | Mamine, T. *et al.*, "Analysis of astigmatism of gain guided laser with a tapered-stripe geometry," *J. Appl. Phys. 56(11)*, American Institute of Physics, pp. 3116-3120 (December 1, 1984). |
| | AG19 | Mamine, T., "Astigmatism and spontaneous emission factor of laser diodes with parabolic gain," *J. Appl. Phys. 54(4)*, American Institute of Physics, pp. 2103-2105 (April 1983). |
| | AH19 | Mamine, T. *et al.*, "New class of gain guided laser with a tapered-stripe structure," *J. Appl. Phys. 54(8)*, American Institute of Physics, pp. 4302-4304 (August 1983). |
| | AI19 | Casey Jr., H.C. *et al.*, "GaAs-$Al_xGa_{1-x}As$ heterostructure laser with separate optical and carrier confinement," *Journal of Applied* Physics, Vol. 45, No. 1, American Institute of Physics, pp. 322-333 (January 1974). |
| | AJ19 | Goldstein, B. *et al.*, "A high-power channeled-substrate-planar AlGaAs laser," *Appl. Phys. Lett. 47(7)*, American Institute of Physics, pp. 655-657 (October 1, 1985). |
| | AK19 | Olsen, G.H. and Ettenberg, M., "Universal stain/etchant for interfaces in III-V compounds," *Journal of Applied Physics*, Vol. 45, No. 11, American Institute of Physics, pp. 5112-5114 (November 1974). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA20 | 6-216409 A | 08/1994 | JP | | | Abstract Enclosed |
| | AB20 | 6-232450 A | 08/1994 | JP | | | Abstract Enclosed |
| | AC20 | 6-232451 A | 08/1994 | JP | | | Abstract Enclosed |
| | AD20 | 6-237012 A | 08/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE20 | Logan, R.A. and Reinhart, F.K., "Optical waveguides in GaAs-AlGaAs epitaxial layers," *J. Appl. Phys.*, Vol. 44, No. 9, American Institute of Physics, pp. 4172-4176 (September 1973). |
| | AF20 | Fujiwara, K. and Ploog, K., "Photoluminescence of GaAs single quantum wells confined by short-period all-binary GaAs/AlAs supterlattices," *Appl. Phys. Lett. 45(11)*, American Institute of Physics, pp. 1222-1224 (December 1, 1984). |
| | AG20 | Calleja, E. *et al.*, "Origin of the nonexponential thermal emission kinetics of *DX* centers in GaAlAs," *Appl. Phys. Lett. 49(11)*, American Institute of Physics, pp. 657-659 (September 15, 1986). |
| | AH20 | Petrou, A., "Photoluminescence In GaAs/AlGaAs Quantum Wells Associated With Excited Confinement Subbands," *Solid State Communications*, Vol. 58, No. 9, Pergamon Journals Ltd., pp. 581-585 (1986). |
| | AI20 | Bajaj, K.K. *et al.*, "High-Resolution Photoluminenscence Studies Of GaAs/GaAlAs Multi-Quantum-Well Structures Grown By Molecular Beam Epitaxy," *Solid State Electronics*, Vol. 29, No. 2, Pergamon Press Ltd., pp. 215-227 (1986). |
| | AJ20 | Sernelius, B.E., "Band-gap shift in heavily doped *n*-type GaAs," *Physical Review B*, Vol. 33, No. 12, The American Physical Society, pp. 8582-8586 (June 15, 1986). |
| | AK20 | Scolfaro, L.M.R. *et al.*, "Impurity levels induced by a C impurity in GaAs," *Physical Review B*, Vol. 34, No. 10, The American Physical Society, pp. 7135-7139 (November 15, 1986). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA21 | 6-244458 A | 09/1994 | JP | | | Abstract Enclosed |
| | AB21 | 6-260680 A | 09/1994 | JP | | | Abstract Enclosed |
| | AC21 | 6-260681 A | 09/1994 | JP | | | Abstract Enclosed |
| | AD21 | 6-260682 A | 09/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE21 | Masselink, W.T. *et al.*, "Shallow Impurity Levels In AlGaAs/GaAs Semiconductor Quantum Wells," *Solid State Electronics*, Vol. 29, No. 2, Pergamon Press Ltd., pp. 205-214 (1986). |
| | AF21 | Wright, A.F. and Nelson, J.S., "Explicit treatment of the gallium 3*d* electrons in GaN using the plane-wave pseudopotential method," *Physical Review B*, Vol. 50, No. 4, The American Physical Society, pp. 2159-2165 (July 15, 1994). |
| | AG21 | Nagahara, M. *et al.*, "Selective Growth of Cubic GaN in Small Areas on Patterned GaAs (100) Substrates by Metalorganic Vapor Phase Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 33, Part 1, No. 1B, pp. 694-697 (January 1994). |
| | AH21 | Kistenmacher, S. *et al.*, "Structural and electrical properties of reactively sputtered InN thin films on AlN-buffered (00.1) sapphire substrates: Dependence on buffer and film growth temperatures and thicknesses," *J. Appl. Phys. 74(3)*, American Institute of Physics, pp. 1684-1691 (August 1, 1993). |
| | AI21 | Holmes, A.L. *et al.*, "X-ray diffracation studies of high-quality GaN heteroeptiaxial film grown by metal organic chemical vapour deposition," *Electronics Letters*, Vol. 30, No. 15, pp. 1252-1254 (July 21, 1994). |
| | AJ21 | Shintani, A. and Minagawa, S., "Optical Properties of GaN Light Emitting Diodes," *J. Electrochem. Soc.*, Vol. 123, No. 11, pp. 1725-1729 (November 1976). |
| | AK21 | Pankove, J.I., "Low-Voltage Blue Electroluminescence in GaN," *IEEE Transactions on Electron Devices*, Vol. ED-22, No. 9, IEEE, pp. 721-724 (September 1975). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA22 | 6-260683 A | 09/1994 | JP | | | Abstract Enclosed |
| | AB22 | 6-260715 A | 09/1994 | JP | | | Abstract Enclosed |
| | AC22 | 6-268257 A | 09/1994 | JP | | | Abstract Enclosed |
| | AD22 | 6-275867 A | 09/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE22 | Sato, H. *et al.*, "Transparent and conductive impurity-doped GaN thin films prepared by an electron cyclotron resonance plasma metalorganic chemical vapor deposition method," *J. Appl. Phys. 75 (3)*, American Institute of Physics, pp. 1405-1409 (February 1, 1994). |
| | AF22 | Lin, M.E. *et al.*, "Refractive indices of wurtzite and zincblende GaN *Electronics Letters*, Vol. 29, No. 20, pp. 1759-1761 (September 30, 1993). |
| | AG22 | Lee, W.-K. *et al.*, "Low pressure and temperature deposition of transparent conductive indium tin oxide (ITO) films by the face target sputtering (FTS) process," *Thin Solid Films 224*, Elsevier Sequoia, pp. 105-111 (1993). |
| | AH22 | Kuwano, N. *et al.*, "Formation of Cubic GaN on (111)B GaAs by Metal-Organic Vapor-Phase Epitaxy with Dimethylhydrazine, *Jpn. J. Appl. Phys.*, Vol. 33., Part 1, No. 6A, pp. 3415-3416 (June 1994). |
| | AI22 | Sasaki, T. *et al.*, "First-Principle Theories On Self-Compensation In II-VI Semiconductors," *Optoelectronics-Devices and Technologies*, Vol. 7 No. 1., MITA Press, pp. 11-18 (June 1992). |
| | AJ22 | Dmitriev, V.A. *et al.*, "Silicon carbide blue and violet light-emitting diodes," *Displays*, Vol. 13, No. 2, Butterworth-Heinemann Ltd., pp. 97-106 (1992). |
| | AK22 | Nurmikk, A.V. *et al.*, "Blue and Green Diode Lasers and LEDs in II-VI Quantum Structures," pp. 311-319. |

| EXAMINER | DATE CONSIDERED |
|---|---|

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA23 | 6-275868 A | 09/1994 | JP | | | Abstract Enclosed |
| | AB23 | 6-283758 A | 10/1994 | JP | | | Abstract Enclosed |
| | AC23 | 6-283825 A | 10/1994 | JP | | | Abstract Enclosed |
| | AD23 | 6-291366 A | 10/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE23 | Bhargava, R.N., "Blue And UV Light Emitting Diodes And Lasers," *Optoelectronics-Devices and Technologies*, Vol. 7 No. 1., MITA Press, pp. 19-47 (June 1992). |
| | AF23 | Torchinskaya, T.V., "Injection-Enhanced Transformation of Luminescence Spectra of Green GaP:N Light-Emitting Diodes," *Journal of Electronic Materials*, Vol. 21, No. 4, TMS, pp. 423-429 (1992). |
| | AG23 | Metzger, R.A., "Turning Blue to Green," *Compound Semiconductor*, pp. 26-28 (July/August 1995). |
| | AH23 | "The End of the Beginning," *Compound Semiconductor*, pp. 34-35 (July/August 1995). |
| | AI23 | Evans, K.R. *et al.*, "Gallium Incorporation Kinetics During Gas-Source Molecular Beam Epitaxy Growth of Gallium Nitride," 13 pages. |
| | AJ23 | Lagerstedt, O. and Monemar, B., "Variation of lattice parameters in GaN with stoichiometry and doping," *Physical Review B*, Vol. 19, No. 6, pp. 3064-3070 (March 15, 1979). |
| | AK23 | Monemar, B. and Lagerstedt, O., "Properties of VPE-grown GaN doped with Al and some iron-group metals," *J. Appl. Phys. 50(10)*, American Institute of Physics, pp. 6480-6491 (October 1979). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA24 | 6-291367 A | 10/1994 | JP | | | Abstract Enclosed |
| | AB24 | 6-291368 A | 10/1994 | JP | | | Abstract Enclosed |
| | AC24 | 6-296041 A | 10/1994 | JP | | | Abstract Enclosed |
| | AD24 | 6-314659 A | 11/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE24 | Shintani, A., "X-Ray Diffraction Topography and Crystal Characterization of GaN Epitaxial Layers for Light-Emitting Diodes," *J. Electrochem Soc.: Solid-State Science and Technology*, Vol. 125, No. 12, pp. 2076-2078 (December 1978). |
| | AF24 | Jacob, G. *et al.*, "Effect Of Growth Parameters On The Properties Of GaN : Zn Epilayers," *Journal of Crystal Growth 42*, North-Holland Publishing Company, pp. 136-143 (1977). |
| | AG24 | Sano, M. and Aoki, M., "Epitaxial Growth of Undoped and Mg-Doped GaN," *Japanese Journal of Applied Physics*, Vol. 15, No. 10, pp. 1943-1950 (October 1976). |
| | AH24 | Madar, R. *et al.*, "High Pressure Solution Growth Of GaN," *Journal of Crystal Growth 31*, North-Holland Publishing Company, pp. 197-203 (1975). |
| | AI24 | Pankove, J.I. *et al.*, "Properties of Zn-doped GaN. I. Photoluminescence," *Journal of Applied Physics*, Vol. 45, No. 3, American Institute of Physics, pp. 1280-1286 (March 1974). |
| | AJ24 | Pankove, J.I. and Berkeyheiser, J.E., "Properties of Zn-doped GaN. II. Photoconductivity," *Journal of Applied Physics*, Vol. 45, No. 9, American Institute of Physics, pp. 3892-3895 (September 1974). |
| | AK24 | Lagerstedt, O. and Monemar, B., "Luminescence in epitaxial GaN : Cd," *Journal of Apllied Physics*, Vol. 45, No. 5, American Institute of Physics, pp. 2266-2272 (May 1974). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA25 | 6-314821 A | 11/1994 | JP | | | Abstract Enclosed |
| | AB25 | 6-314822 A | 11/1994 | JP | | | Abstract Enclosed |
| | AC25 | 6-314823 A | 11/1994 | JP | | | Abstract Enclosed |
| | AD25 | 6-314825 A | 11/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE25 | Dingle, R. *et al.*, "Absorption, Reflectance, and Luminescence of GaN Epitaxial Layers, *Physical Review B*, Vol. 4, No. 4, pp. 1211-1218 (August 15, 1971). |
| | AF25 | Illegems, M. *et al.*, "Luminescence of Zn- and Cd-doped GaN," *J. Appl. Phys.*, Vol. 43, No. 9., pp. 3797-3800 (September 1972). |
| | AG25 | Shintani, A. and Minagawa, S., "Light Emitting Patterns of Gallium Nitride Electroluminescence," *J. Electrochem. Soc.: Solid-State Science and Technology*, Vol. 123, No. 10, pp. 1575-1578 (October 1976). |
| | AH25 | Matsunami, H., "Growth Of Silicon Carbide And Application To Blue Light-Emitting Diodes And Transistors," *Optoelectronics – Devices and Technologies*, Vol. 2, No. 1, Mita Press, pp. 29-44 (June 1987). |
| | AI25 | Koide, N. *et al.*, "Doping of GaN with Si and properties of blue m/i/n/$n^+$ GaN LED with Si-doped $n^+$-layer by MOVPE," *Journal of Crystal Growth 115,* Elsevier Science Publishers B.V., pp. 639-642 (1991). |
| | AJ25 | Yoshida, S. *et al.*, "Growth Of Cubic And Hexagonal GaN On GaAs By Gas Source MBE And Their Properties," pp. 40-44. |
| | AK25 | Fertitta, K.G. *et al.*, "High-quality GaN heteroepitaxial films grown by metalorganic chemical vapor deposition," *Appl. Phys. Lett. 65 (14)*, American Institute of Physics, pp. 1823-1825 (October 3, 1994). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA26 | 6-338632 A | 12/1994 | JP | | | Abstract Enclosed |
| | AB26 | 6-101587 B2 | 12/1994 | JP | | | Abstract Enclosed |
| | AC26 | 6-350137 A | 12/1994 | JP | | | Abstract Enclosed |
| | AD26 | 6-350138 A | 12/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

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|---|---|---|
| | AE26 | Giordana, A. *et al.*, "Modulated Reflectance and Absorption Characterization of Single Crystal GaN Films," *Journal of Electronic Materials*, Vol. 23, No. 6, pp. 509-512 (1994). |
| | AF26 | Mattox, D.M., "An Introduction To Physical Vapor Deposition (PVD) Processes," *AESF SUR/FIN*, pp. 177-184 (1992). |
| | AG26 | Stevens, K.S. *et al.*, "Growth of group III nitrides on Si(111) by plasma-assisted molecular beam epitaxy," *J. Vac. Sci. Technol. B 12(2)*, American Vacuum Society, pp. 1186-1189 (March/April 1994). |
| | AH26 | Chin, V.W.L. *et al.*, "Electron mobilites in gallium, indium, and aluminium nitrides," *J. Appl. Phys. 75 (11)*, American Institute of Physics. Pp. 7365-7372 (June 1, 1994). |
| | AI26 | Berger, H.H., "Models For Contacts To Planar Devices," *Solid State Electronics*, Vol. 15, No. 2-A, Pergamon Press, pp. 145-158 (1972). |
| | AJ26 | Cava, R.J. *et al.*, "$GaInO_3$: A new transparent conducting oxide," *Appl. Phys. Lett. 64 (16)*, American Institute of Physics, pp. 2071-2072 (April 18, 1994). |
| | AK26 | Ueno, Y. *et al.*, "Low-Noise High-Power 680-nm AlGaInP Laser with Sub-GHz Frequency Response," pp. 95-96. |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA27 | 6-350199 A | 12/1994 | JP | | | Abstract Enclosed |
| | AB27 | 6-350200 A | 12/1994 | JP | | | Abstract Enclosed |
| | AC27 | 6-350201 A | 12/1994 | JP | | | Abstract Enclosed |
| | AD27 | 6-350204 A | 12/1994 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE27 | Streifer, W. *et al.*, "Longitudinal mode spectra of diode lasers," *Appl. Phys. Lett. 40 (4)*, American Institute of Physics, pp. 305-307 (February 15, 1982). |
| | AF27 | Stolyarov, S.N., "Influence of interference coatings on the optical strength of semiconductor laser mirrors," *Sov. J. Quantum Electron. 18 (8)*, American Institute of Physics, pp. 1021-1025 (August 1988). |
| | AG27 | "Laser Structures And Their Performance," *Semiconductor Lasers*, pp. 180-230. |
| | AH27 | Kressel, H. *et al.*, "Mode Guiding In Symmetrical (AlGa)As-GaAs Heterojunction Lasers With Very Narrow Active Regions," Reprinted from RCA Review, Vol. 32, pp. 393-401 (September 1971). |
| | AI27 | Taylor, G.W. *et al.*, "Demonstration of the heterostructure field-effect transistor as an optical modulator," *Appl. Phys. Lett., 59 (9)*, American Institute of Physics, pp. 1031-1033 (August 26, 1991). |
| | AJ27 | Ou, S.S. *et al.*, "High power cw operation of GaAs/GaAlAs surface-emitting lasers mounted in the junction-up configuration," *Appl. Phys. Lett. 59 (9)*, American Institute of Physics, pp. 1037-1039 (August 26, 1991). |
| | AK27 | Kawai, H. *et al.*, "High Al-Content Visible (AlGa)As Multiple Quantum Well Heterostructure Lasers Grown by Metalorganic Chemical Vapor Deposition," *Japanese Journal of Applied Physics*, Vol. 22, No. 11, pp. L727-L729 (November 1983). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA28 | 7-7182 A | 01/1995 | JP | | | Abstract Enclosed |
| | AB28 | 7-7183 A | 01/1995 | JP | | | Abstract Enclosed |
| | AC28 | 7-15041 A | 01/1995 | JP | | | Abstract Enclosed |
| | AD28 | 7-30190 A | 01/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE28 | Ungar, J. *et al.*, "GaAlAs Window Lasers Emitting 500 mW CW In Fundamental Mode," *Electronics Letters*, Vol. 26, No. 18, pp. 1441-1442 (August 30, 1990). |
| | AF28 | Welch, D. *et al.*, "High Reliability, High Power, Single Mode Laser Diodes," *Electronics Letters*, Vol. 26, No. 18, pp. 1481-1483 (August 30, 1990). |
| | AG28 | Hayashi, I. *et al.*, "Junction Lasers Which Operate Continuously At Room Temperature," Reprinted from Appl. Phys. Lett.,Vol. 17, pp. 109-111 (August 1970). |
| | AH28 | Watanabe, M. *et al.*, "Highly Reliable Operation of InGaP/InGaAlP Multi-Quantum-Well Visible Laser Diodes," *Jpn. J. Appl. Phys.*,Vol. 31, Part 2, No. 10A, pp. L1399-L1400 (October 1992). |
| | AI28 | Honda, S. *et al.*, "Transverse-Mode Stabilised 630 nm-Band AlGaInP Strained Multiquandum-Well Laser Diodes Grown On Misoriented Substrates," *Electronics Letters*, Vol. 28, No. 14, PP. 1365-1367 (July 2, 1992). |
| | AJ28 | Kobayashi, K. *et al.*, "632.7 nm CW Operation (20°C) of AlGaInP Visible Laser Diodes Fabricated on (001) 6° off toward [110] GaAs Substrate," *Japanese Journal of Applied Physics*, Vol. 29, No. 9, pp. L1669-L1671 (September 1990). |
| | AK28 | Kawamura, Y. *et al.*, "InGaAs/InGaAlAs MQW Lasers with InGaAsP Guiding Layers Grown by Gas Source Molecular Beam Epitaxy," *IEEE Transactions Photonics Technology Letters*, Vol. 3, No. 11, IEEE, pp. 960-962 (November 1991). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA29 | 7-9999 B2 | 02/1995 | JP | | | Abstract Enclosed |
| | AB29 | 7-45867 A | 02/1995 | JP | | | Abstract Enclosed |
| | AC29 | 7-94782 A | 04/1995 | JP | | | Abstract Enclosed |
| | AD29 | 7-94783 A | 04/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE29 | Kamiyama, S. *et al.*, "Improvement of catastrophic optical damage level of AlGaInP visible laser didoes by sulfur treatment," *Appl. Phys. Lett. 58(23)*, American Institute of Physics, pp. 2595-2597 (June 10, 1991). |
| | AF29 | Morkoç, H. *et al.*, "Large-band-gap SiC, III-V nitride, and II-VI ZnSe-based semiconductor," *J. Appl. Phys. 76(3)*, American Institute of Physics, pp. 1363-1398 (August 1, 1994). |
| | AG29 | Ueno, Y. *et al.*, "Novel Window-Structure AlGaInP Visible-Light Laser Diodes with Non-Absorbing Facets Fabricated by Utilizing GaInP Natural Superlattice Disordering," *Japanese Journal of Applied Physics*, Vol. 29, No. 9, pp. L1666-L1668 (September 1990). |
| | AH29 | Ueno, Y. *et al.*, "30 mW 690 nm High-Power Strained Quantum Well AlGaInP Laser," *NEC Res. & Develop.*, Vol. 33, No. 3, pp. 393-400 (July 1992). |
| | AI29 | Wilson, A.D., "Reactively Sputtered Silicon Oxy-Nitride Films for Solar Absorber Anti-Reflection Coatings," *Solar Energy Materials 10*, Elsevier Science Publishers, B.V., pp. 9-24 (1984). |
| | AJ29 | Demichelis, F. *et al.*, "Correlation between physical properties and hydrogen concentration in magnetron-sputtered amorphous silicon," *Physical Review B*, Vol. 33, No. 10, The American Physical Society, pp. 7022-7028 (May 15, 1986). |
| | AK29 | Brandt, M.S. *et al.*, "Hydrogénation of *p*-type gallium nitride," *Appl. Phys. Lett. 64(17)*, American Institute of Physics, pp. 2264-2266 (April 25, 1994). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA30 | 7-106633 A | 04/1995 | JP | | | Abstract Enclosed |
| | AB30 | 7-122520 A | 05/1995 | JP | | | Abstract Enclosed |
| | AC30 | 7-131068 A | 05/1995 | JP | | | Abstract Enclosed |
| | AD30 | 7-131069 A | 05/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE30 | Wickenden, D.K. *et al.*, "Growth Of Epitaxial Layers Of Gallium Nitride On Siliicon Carbide And Corundum Substrates," *Journal of Crystal Growth 9*, North-Holland Publishing Co., pp. 158-164 (1971). |
| | AF30 | Norton, M.G. *et al.*, "Brazing of aluminium nitride substrates," *J. Mater. Res.*, Vol. 5, No. 10, pp. 2172-2176 (October 1990). |
| | AG30 | Weber, J. and Singh, M., "Photoluminescence Detection Of Shallow Impurity Neutralization In III-V Compound Semiconductors," *Mat. Res. Soc. Symp. Proc.*, Vol. 104, Materials Research Society, pp. 325-329 (1988). |
| | AH30 | Zanzucchi, P.J. *et al.*, "Optical Reflectance Method for Determining the Surface Quality of Sapphire ($Al_2O_3$)," *J. Electrochem. Soc.: Solid-State Sicence and Technology*, Vol. 125, No. 2, pp. 299-305 (February 1978). |
| | AI30 | Vettiger, P. *et al.*, "Full-Wafer Technology-A New Approach to Large-Scale Laser Fabrication and Integration," *Journal of Quantum Electronics*, Vol. 27, No. 6, IEEE, pp. 1319-1331 (June 1991). |
| | AJ30 | Matsuoka, T., "InGaAlN Growth," pp. 241-242. |
| | AK30 | Lester, S.D. *et al.*, "High dislocation densities in high efficiency GaN-based light-emitting diodes," *Appl. Phys. Lett. 66(10)*, American Institute of Physics, pp. 1249-1251 (March 6, 1995). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA31 | 7-142763 A | 06/1995 | JP | | | Abstract Enclosed |
| | AB31 | 7-153996 A | 06/1995 | JP | | | Abstract Enclosed |
| | AC31 | 7-162038 A | 06/1995 | JP | | | Abstract Enclosed |
| | AD31 | 7-176826 A | 07/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE31 | Ponce, F.A., "Crystalline structure of AlGaN epitaxy on sapphire using AlN buffer layers," *Appl. Phys. Lett. 65(18)*, American Institute of Physics, pp. 2302-2304 (October 31, 1994). |
| | AF31 | Khan, M.A. *et al.*, "GaN/AlN digital alloy short-period superlattices by switched atomic layer metalorganic chemical vapor deposition," *Appl. Phys. Lett. 63(25)*, American Institute of Physics, pp. 3470-3472 (December 20, 1993). |
| | AG31 | Lin, M.E. *et al.*, "*p*-type zinc-blende GaN on GaAs substrates," *Appl. Phys. Lett. 63(7)*, American Institute of Physics, pp. 932-933 (August 16, 1993). |
| | AH31 | Pearton, S.J. *et al.*, "Low bias electron cyclotron resonance plasma etching of GaN, AlN and InN," *Appl. Phys. Lett. 64(17)*, American Institute of Physics, pp. 2294-2296 (April 25, 1994). |
| | AI31 | Zavada, J.M. *et al.*, "Hydrogenation of GaN, AlN and InN," *Appl. Phys. Lett. 64(20)*, American Institute of Physics, pp. 2724-2726 (May 16, 1994). |
| | AJ31 | Cho, S.H. *et al.*, "Photoluminescence of Undoped GaN Grown on *c*-Plane $Al_2O_3$ by Electron Cyclotron Resonance Molecular Beam Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 34, Part 2, No. 12A, pp. L1575-L1578 (December 1, 1995). |
| | AK31 | Cho, S.H. *et al.*, "Epitaxial Growth of GaN on Sapphire (0001) Substrates by Electron Cyclotron Resonance Molecular Beam Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 34, Part 2, No. 2B, pp. L236-L239 (February 15, 1995). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA32 | 7-183576 A | 07/1995 | JP | | | Abstract Enclosed |
| | AB32 | 7-202265 A | 08/1995 | JP | | | Abstract Enclosed |
| | AC32 | 7-221103 A | 08/1995 | JP | | | Abstract Enclosed |
| | AD32 | 7-221347 A | 08/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE32 | Tsuchiya, H. *et al.*, "Homoepitaxial Growth of Cubic GaN by Hydride Vapor Phase Epitaxy on Cubic GaN/GaAs Substrates Prepared with Gas Source Molecular Beam Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 33, Part 1, No. 4A, pp. 1747-1752 (April 1994). |
| | AF32 | Miraglienza, J., "Optical Second-Harmonic Investigations of GaN Thin Films on Sapphire," 1 page. |
| | AG32 | Harris, G.L. *et al.*, "Beta Silicon Carbide Schottky Diode FET Inverters Grown on Silicon," 1 page. |
| | AH32 | Wickenden, A.E. *et al.*, "The Effect of Thermal Annealing on GaN Nucleation Layers Deposited on (0001) Sapphire by Metalorganic Chemical Vapor Deposition," *J. Appl. Phys. (accepted for publication)*, 25 pages. |
| | AI32 | Hwang, C.-Y., "Characteristics Of Gallium Nitride Grown On (0001) Sapphire By Plasma-Enhanced Atomic Layer Epitaxy," 5 pages (appears to have been published in 1993). |
| | AJ32 | Wongchotigul, K. *et al.*, "Growth of Solid Solutions of Aluminum Nitride and Silicon Carbide in a Low Pressure Vertical Reactor MOCVD," 1 page. |
| | AK32 | Hong, C.H. *et al.*, "GaN and AlN OMVPE Growth Using Phenylhydrazine," 2 pages. |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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|---|---|---|---|---|---|---|---|
| | AA33 | 7-235729 A | 09/1995 | JP | | | Abstract Enclosed |
| | AB33 | 7-83136 B2 | 09/1995 | JP | | | Abstract Enclosed |
| | AC33 | 7-254733 A | 10/1995 | JP | | | Abstract Enclosed |
| | AD33 | 7-263748 A | 10/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE33 | Nihei, M. *et al.*, "Effect of Adding $CO_2$ to $CH_4/H_2$ Mixture for InGaAs/GaAs Selective Reactive Ion Etching," *Jpn. J. Appl. Phys.*, Vol. 34, Part 1, No. 12B, pp. 6819-6823 (December 1995). |
| | AF33 | Pearton, S.J. *et al.*, "Reversible changes in doping of InGaAlN alloys induced by ion implantation or hydrogenation," *Appl. Phys. Lett. 63(8)*, American Institute of Physics, pp. 1143-1145 (August 23, 1993). |
| | AG33 | Igarashi, O. "Heteroepitaxial Growth of $GaN_{1-x}P_x$ ($x \leq 0.09$) on Sapphire Substrates," *Jpn. J. Appl. Phys.*, Vol. 31, Part 1, No. 12A, pp. 3791-3793 (December 1992). |
| | AH33 | Khan, M.A. *et al.*, "Low pressure metalorganic chemical vapor deposition of AlN over sapphire substrates," *Appl. Phys. Lett. 61(21)*, American Institute of Physics, pp. 2539-2541 (November 23, 1992). |
| | AI33 | Wakahara, A. *et al.*, "Epitaxial Growth Of Indium Nitride," *Journal of Crystal Growth 99*, Elsevier Science Publishers B.V., pp. 385-389 (1990). |
| | AJ33 | Sakai, S. *et al.*, "Band Gap Energy and Band Lineup of III-V Alloy Semiconductors Incorporating Nitrogen and Boron," *Jpn. J. Appl. Phys.*, Vol. 32, Part 1, No. 10, pp. 4413-4417 (October 1993). |
| | AK33 | Miyoshi, S. *et al.*, "MOVPE growth of cubic GaN on GaAs using dimethyhydrazine," *Journal of Crystal Growth 124*, Elsevier Science Publishers B.V., pp. 439-442 (1992). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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|---|---|---|---|---|---|---|---|
| | AA34 | 7-263749 A | 10/1995 | JP | | | Abstract Enclosed |
| | AB34 | 7-273069 A | 10/1995 | JP | | | Abstract Enclosed |
| | AC34 | 7-273366 A | 10/1995 | JP | | | Abstract Enclosed |
| | AD34 | 7-288334 A | 10/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE34 | Yung, K. *et al.*, "Observation of stimulated emission in the near ultraviolet from a molecular beam epitaxy grown GaN film on sapphire in a vertical-cavity, singel pass configuration," *Appl. Phys. Lett. 64(9)*, American Institute of Physics, pp. 1135-1137 (February 28, 1994). |
| | AF34 | Sun, C.-J. and Razeghi, M., "Comparison of the physical properties of GaN thin films deposited on (0001) and (0112) sapphire substrates," *Appl. Phys. Lett. 63(7)*, American Institute of Physics, pp. 973-975 (August 16, 1993). |
| | AG34 | Miyauchi, M. *et al.*, "Growth of Aluminum Nitride Films on Silicon by Electron-Cyclotron-Resonance-Assisted Molecular Beam Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 31, Part 2, No. 12A, pp. L1714-L1717 (December 1, 1992). |
| | AH34 | Singh, R. *et al.*, "Intensity dependence of photoluminescence in GaN thin films," *Appl. Phys. Lett. 64(3)*, American Institute of Physics, pp. 336-338 (January 17, 1994). |
| | AI34 | Miura, Y. *et al.*, "New Epitaxial Growth Method of Cubic GaN on (100) GaAs Using $(CH_3)_3Ga$, HCl and $NH_3$," *Jpn. J. Appl. Phys.*, Vol. 34, Part 2, No. 4A, pp. L401-L404 (April 1, 1995). |
| | AJ34 | Beresford, R. *et al.*, "Influence of substrate electrical bias on the growth of GaN in plasma-assisted epitaxy," *J. Vac. Scie. Technol. B 13(2)*, American Vacuum Society, pp. 792-795 (March/April 1995). |
| | AK34 | Lin, W.-T. *et al.*, "Epitaxial growth of cubic AlN films on (100) and (111) silicon by pulsed laser ablation," *Appl. Phys. Lett. 66(16)*, American Institute of Physics, pp. 2066-2068 (April 17, 1995). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not consider d. Include copy of this form with next communication to Applicant.

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA35 | 7-297446 A | 11/1995 | JP | | | Abstract Enclosed |
| | AB35 | 7-297447 A | 11/1995 | JP | | | Abstract Enclosed |
| | AC35 | 7-297494 A | 11/1995 | JP | | | Abstract Enclosed |
| | AD35 | 7-297495 A | 11/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE35 | Zhang, W. *et al.*, "Preparation of epitaxial AlN films by electron cyclotron resonance plasma-assisted chemical vapor deposition on Ir- and Pt-coated sapphire substrates," *Appl. Phys. Lett. 64(11)*, American Institute of Physics, pp. 1359-1361 (March 14, 1994). |
| | AF35 | Kim, K. *et al.*, "Growth and characterization of GaN on sapphire (0001) using plasma-assisted ionized source beam epitaxy," *J. Vac. Sci. Technol. B 13(2)*, American Vacuum Society, pp. 796-799 (March/April 1995). |
| | AG35 | Qiu, C.H. *et al.*, "Study of defect states in GaN films by photoconductivity measurement," *Appl. Phys. Lett. 66(20)*, American Institute of Physics, pp. 2712-2714 (May 15, 1995). |
| | AH35 | Meney, A.T. *et al.*, "Theory of optical gain in ideal GaN heterostructure lasers," *Appl. Phys. Lett. 67(20)*, American Institute of Physics, pp. 3013-3015 (November 13, 1995). |
| | AI35 | Qian, W. *et al.*, "Open-core screw dislocations in GaN epilayers observed by scanning force microscopy and high-resolution transmission electron microscopy," *Appl. Phys. Lett. 67(16)*, American Institute of Physics, pp. 2284-2286 (October 16, 1995). |
| | AJ35 | Lee, S.S. *et al.*, "Single-phase Deposition of α-Gallium Nitride by a Laser-induced Transport Process," *J. Mater. Chem.*, Vol. 3, pp. 347-351 (1993). |
| | AK35 | Ho, K.-L. *et al.*, "MOVPE of AlN and GaN by using novel precursors," *Journal of Crystal Growth 107*, Elsevier Science Publishers B.V., pp. 376-380 (1991). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA36 | 7-297496 A | 11/1995 | JP | | | Abstract Enclosed |
| | AB36 | 7-312350 A | 11/1995 | JP | | | Abstract Enclosed |
| | AC36 | 7-319427 A | 12/1995 | JP | | | Abstract Enclosed |
| | AD36 | 7-326794 A | 12/1995 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE36 | Rowland, L.B. *et al.*, "Aluminum nitride/silicon carbide multilayer heterostructure produced by plasma-assisted, gas-source molecular beam epitaxy," *Appl. Phys. Lett. 62(25)*, American Institute of Physics, pp. 3333-3335 (June 21, 1993). |
| | AF36 | He, Z.Q. *et al.*, "Molecular-beam-epitaxy growth of GaN on GaAs (100) by using reactive nitrogen source," *Appl. Phys. Lett. 64(3)*, American Institute of Physics, pp. 315-317 (January 17, 1994). |
| | AG36 | Eaglesham, D.J. and Cerullo, M., "Dislocation-Free Stranski-Krastanow Growth of Ge on Si (100)," *Physical Review Letters*, Vol. 64, No. 16, The American Physical Society, pp. 1943-1946 (April 16, 1990). |
| | AH36 | *Integrated Optoelectronics*, pp. 356-365. |
| | AI36 | Kumakura et al., "Low p-type contact resistance using Mg-doped InGaN and InGaN/GaN superlattices," 2 pages. |
| | AJ36 | Jang, J.-S., "Formation of low-resistance, thermally stable, and transparent Pt-based ohmic contacts to surface-treated *p*-GaN," 2 pages. |
| | AK36 | Smith, M. *et al.*, "Acceptor-bound exciton recombination dynamics in *p*-type GaN," *Appl. Phys. Lett. 67 (22)*, American Institute of Physics, pp. 3295-3297 (November 27, 1995). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA37 | 7-335975 A | 12/1995 | JP | | | Abstract Enclosed |
| | AB37 | 60-41478 B2 | 09/1985 | JP | | | Abstract Enclosed |
| | AC37 | 62-165991 A | 07/1987 | JP | | | Abstract Enclosed |
| | AD37 | 64-17484 A | 01/1989 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE37 | Fischer, S. *et al.*, "On *p*-type doping in GaN-acceptor binding energies," *Appl. Phys. Lett. 67 (9)*, American Institute of Physics, pp. 1298-1300 (August 28, 1995). |
| | AF37 | Rubin, M. *et al.*, "*p*-type gallium nitride by reactive ion-beam molecular beam epitaxy with ion implantation, diffusion, or coevaporation of Mg," *Appl. Phys. Lett. 64 (1)*, American Institute of Physics, pp. 64-66 (January 3, 1994). |
| | AG37 | Ohba, Y. and Hatano, A., "Study of H atom behaviour in Mg doped GaN grown by MOCVD," pp. 221-224. |
| | AH37 | Ohuchi, Y. *et al.*, "New Dopant Precursors for n-type and p-type GaN," 2 pages. |
| | AI37 | Toda, A. *et al.*, "Blue-green Laser Diode grown by photoassisted MOCVD," 2 pages. |
| | AJ37 | Ohkubo, M. *et al.*, "Magnesium-doped InGaAs Using $(C_2H_5C_5H_4)_2Mg$: Application to InP-based HBTs," 2 pages. |
| | AK37 | Hierro, A. *et al.*, "Detection and identification of deep levels in n-GaN," 2 pages. |

| EXAMINER | DATE CONSIDERED |
|---|---|

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA38 | 1-111375 A | 04/1989 | JP | | | Abstract Enclosed |
| | AB38 | 3-203388 A | 09/1991 | JP | | | Abstract Enclosed |
| | AC38 | 4-11375 A | 01/1992 | JP | | | Abstract Enclosed |
| | AD38 | 4-25191 A | 01/1992 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE38 | Foresi, J.S. and Moustakas, T.D., "Metal contacts to gallium nitride," *Appl. Phys. Lett. 62 (22)*, American Institute of Physics, pp. 2859-2861 (May 13, 1993). |
| | AF38 | Hiramatsu, K. *et al.*, "Relaxation Mechanism of Thermal Stresses in the Heterostructure of GaN Grown on Sapphire by Vapor Phase Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 32, Part 1, No. 4, pp. 1528-1533 (1993). |
| | AG38 | Detchprohm, T. *et al.*, "Relaxation Process of the Thermal Strain in the GaN / α-$Al_2O_3$ Heterostructure and Determination of the Intrinsic Lattice Constants of GaN Free from the Strain," *Jpn. J. Appl. Phys.*, Vol. 31, Part 2, No. 10B, pp. L1454-L1456 (October 15, 1992). |
| | AH38 | Akasaki, I. and Amano, H., "Perspective Of The UV / Blue Light Emitting Devices Based On GaN And Related Compounds," *Optoelectronics - Devices and Technologies*, Vol. 7, No. 1, Mita Press, pp. 49-56 (June 1992). |
| | AI38 | Hiramatsu, K. *et al.*, "Growth mechanism of GaN grown on sapphire with AlN buffer layer by MOVPE," *Journal of Crystal Growth 115*, Elsevier Science Publishers B.V., pp. 628-633 (1991). |
| | AJ38 | Hiramatsu, K. *et al.*, "MOVPE growth of GaN on a misoriented sapphire substrate," *Journal of Crystal Growth 107*, Elsevier Science Publishers B.V., pp. 509-512 (1991). |
| | AK38 | Amano, H. "P-Type Conduction in Mg-Doped GaN Treated with Low-Energy Electron Beam Irradiation (LEEBI)," *Japanese Journal of Applied Physics*, Vol. 28, No. 11, pp. L2112-L2114 (December 1989). |

| EXAMINER | DATE CONSIDERED |
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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA39 | 4-209577 A | 07/1992 | JP | | | Abstract Enclosed |
| | AB39 | 4-236478 A | 08/1992 | JP | | | Abstract Enclosed |
| | AC39 | 5-110138 A | 04/1993 | JP | | | Abstract Enclosed |
| | AD39 | 5-343802 A | 12/1993 | JP | | | Abstract Enclosed |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE39 | Akasaki, I. *et al.*, "Effects of AlN Buffer Layer On Crystallographic Structure And On Electrical And Optical Properties Of GaN and $Ga_{1-x}Al_xN$ ($0<x\leq 0.4$) Films Grown On Sapphire Substrate By MOVPE," *Journal of Crystal Growth 98*, Elsevier Science Publishers B.V., pp. 209-219 (1989). |
| | AF39 | Akasaki, I. and Amano, H., "Crystal growth of column III nitrides and their applications to short wavelength light emitters," *Journal of Crystal Growth 146*, Elsevier Science Publsihers B.V., pp. 455-460 (1995). |
| | AG39 | Detchprohm, T. *et al.*, "Metalorganic vapor phase epitaxy growth and characteristics of Mg-doped GaN using GaN substrates," *Journal of Crystal Growth 145*, Elsevier Science Publishers B.V., pp. 192-196 (1994). |
| | AH39 | Tanaka, T. *et al.*, "*p*-type conduction in Mg-doped GaN and $Al_{0.08}Ga_{0.92}N$ grown by metalorganic vapor phase epitaxy," *Appl. Phys. Lett. 65 (5)*, American Institute of Physics, pp. 593-594 (August 1, 1994). |
| | AI39 | Kim, S.T. *et al.*, "Optical gain of optically pumped $Al_{0.1}Ga_{0.9}N$/GaN double heterostructure at room temperature," *Appl. Phys. Lett. 64 (12)*, American Institute of Physics, pp. 1535-1536 (March 21, 1994). |
| | AJ39 | Amano, H. *et al.*, "Room-Temperature Low-Threshold Surface-Stimulated Emission by Optical Pumping from $Al_{0.1}Ga_{0.9}N$/GaN Double Heterostructure," *Jpn. J. Appl. Phys.*, Vol. 32, Part 2, No. 7B, pp. L1000-L1002 (July 15, 1993). |
| | AK39 | Maier, K. *et al.* "Radiative Energy Transfer in GaN:Mg/$Al_2O_3$:$Cr^{3+}$ Epitaxial Systems," *Jpn. J. Appl. Phys.*, Vol. 32, Part 2, No. 6B, pp. L846-L848 (June 15, 1993). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA40 | 0 496 030 A2&A3 | 07/1992 | EP | | | N/A |
| | AB40 | 0 541 373 B1 | 09/1998 | EP | | | N/A |
| | AC40 | | | | | | |
| | AD40 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE40 | Detchprohm, T. *et al.*, "Hydride vapor phase epitaxial growth of a high quality GaN film usig a ZnO buffer layer," *Appl. Phys. Lett. 61(22)*, American Institute of Physics, pp. 2688-2690 (November 30, 1992). |
| | AF40 | Akasaki, I. *et al.*, "MOVPE Growth Of GaN and $Al_xGa_{1-x}N$ And Their Luminescence And Electrical Properties," *Memoirs of the Faculty of Engineering, Nagoya University*, Vol. 43, No. 2, pp. 147-178 (1991). |
| | AG40 | Kuwano, N. *et al.*, "Cross-sectional TEM study of microstructures in MOVPE GaN films grown on α-$Al_2O_3$ with a buffer layer of AlN," *Journal of Crystal Growth 115*, Elsevier Science Publishers B.V., pp. 381-387 (1991). |
| | AH40 | Hiramatsu, K. *et al.*, "Cathodoluminescence Of MOVPE-Grown GaN Layer On α–$Al_2O_3$," *Journal of Crystal Growth 99*, Elsevier Science Publishers B.V., pp. 375-380 (1990). |
| | AI40 | Koide, Y. *et al.*, "Effect of AlN Buffer Layer on AlGaN/ α–$Al_2O_3$ Hereotepitaxial Growth by Metalorganic Vapor Phase Epitaxy," *Japanese Journal of Applied Physics*, Vol. 27, No. 7, pp. 1156-1161 (July 1988). |
| | AJ40 | Nakamura, S. *et al.*, "High-Brightness InGaN Blue, Green and Yellow LEDs with Quantum Well Structures," *Jpn. J. Appl. Phys.*, Vol. 34, Part 2, No. 7A, pp. L797-L799 (July 1, 1995). |
| | AK40 | Nakamura, S. *et al.*, "High-brightness InGaN/AlGaN double-heterostructure blue-green-light-emitting diodes," *J. Appl. Phys. 76(12)*, American Institute of Physics, pp. 8189-8191 (December 15, 1994). |

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|---|---|---|---|---|---|---|---|
| | AA41 | | | | | | |
| | AB41 | | | | | | |
| | AC41 | | | | | | |
| | AD41 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE41 | Nakamura, S. *et al.*, "High-Power GaN P-N Junction Blue-Light-Emitting Diodes," *Japanese Journal of Applied Physics*, Vol. 30, No. 12A, pp. L1998-L2001 (December 1991). |
| | AF41 | Nakamura, S. *et al.*, "High-power InGaN/GaN double-heterostructure violet light emitting diodes," *Appl. Phys. Lett. 62(19)*, American Institute of Physics, pp. 2390-2392 (May 10, 1993). |
| | AG41 | Nakamura, S. *et al.*, "Si-Doped InGaN Films Grown on GaN Films," *Jpn. J. Appl. Phys.*, Vol. 32, Part 2, No. 1A/B, pp. L16-L19 (January 15, 1993). |
| | AH41 | Nakamura, S. and Mukai, T., "High-Quality InGaN Films Grown on GaN Films," *Jpn. J. Appl. Phys.*, Vol. 31, Part 2, No. 10B, pp. L1457-L1459 (October 15, 1992). |
| | AI41 | Nakamura, S. *et al.*, "Si- and Ge-doped GaN Films Grown with GaN Buffer Layers," *Jpn. J. Appl. Phys.*, Vol. 31, Part 1, No. 9A, pp. 2883-2888 (September 1992). |
| | AJ41 | Nakamura, S. *et al.*, "Hole Compensation Mechanism of P-Type GaN Films," *Jpn. J. Appl. Phys.*, Vol. 31, Part 1, No. 5A, pp. 1258-1266 (May 1992). |
| | AK41 | Nakamura, S., "GaN Growth Using GaN Buffer Layer," *Japanese Journal of Applied Physics*, Vol. 30, No. 10A, pp. L1705-L1707 (October 1991). |

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| | AA42 | | | | | | |
| | AB42 | | | | | | |
| | AC42 | | | | | | |
| | AD42 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE42 | Nakamura, S. *et al.*, "Highly P-Typed Mg-Doped GaN Films Grown with GaN Buffer Layers," *Japanese Journal of Applied Physics*, Vol. 30, No. 10A, pp. L1708-L1711 (October 1991). |
| | AF42 | Nakamura, S., "*In Situ* Monitoring of GaN Growth Using Interference Effects," *Japanese Journal of Applied Physics*, Vol. 30, No. 8, pp. L1620-L1627 (August 1991). |
| | AG42 | Nakamura, S. *et al.*, "Novel metalorganic chemical vapor deposition system for GaN growth," *Appl. Phys. Lett. 58(18)*, American Institute of Physics, pp. 2021-2023 (May 6, 1991). |
| | AH42 | Okamura, H. *et al.*, "Optical properties near the band gap on hexagonal and cubic GaN," *Appl. Phys. Lett. 64(22)*, American Institute of Physics, pp. 2997-2999 (May 30, 1994). |
| | AI42 | Grzegory, I. *et al.*, "III-V Nitrides-Thermodynamics And Crystal Growth At High $N_2$ Pressure," *J. Phys. Chem. Solids*, Vol. 56, No. 3/4, Pergamon Press, pp. 639-647 (1995). |
| | AJ42 | Zur, A. and McGill, T.C., "Lattice match: An application to heteroepitaxy," *J. Appl. Phys. 55 (2)*, American Institute of Physics, pp. 378-386 (January 15, 1984). |
| | AK42 | Antonov, P.I. *et al.*, "Anisotropy Of Thermoelastic Stresses In Shaped Sapphire Single Crystals," *Journal of Crystal Growth 52*, North-Holland Publishing Company, pp. 404-410 (1981). |

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|---|---|---|---|---|---|---|---|
| | AA43 | | | | | | |
| | AB43 | | | | | | |
| | AC43 | | | | | | |
| | AD43 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE43 | Eliseev, P.G. *et al.*, "Impurity-Related Photoluminescence From InGaN LED Material," pp. 104-105. |
| | AF43 | Kishino, S. *et al.*, "Half-width and peak-intensity measurement of a rocking curve obtained from silicon on sapphire using soft x-ray beams," *Journal of Applied Physics*, Vol. 48, No. 7, American Institute of Physics, pp. 3138-3140 (July 1977). |
| | AG43 | Palummo, M. *et al.*, "Electronic Structure of Cubic GaN with Self-Energy Corrections," *Europhysics Letters*, 26 (8), pp. 607-612 (1994). |
| | AH43 | Bulman, G.E. *et al.*, "Demonstration of a Cleaved-Facet InGaN/GaN MQW SCH Laser Grown on 6H-SiC," 2 pages. |
| | AI43 | Trilhe, J. *et al.*, "Characterization Of The Silicon-Sapphire Interface," *Journal of Crystal Growth 45*, North-Holland Publishing Company, pp. 439-444 (1978). |
| | AJ43 | Sun, C.J. *et al.*, "Thermal stability of GaN thin films grown on (0001) $Al_2O_3$, (0112) $Al_2O_3$ and $(0001)_{Si}$ 6H-SiC substrates," *J. Appl. Phys. 76 (1)*, American Institute of Physics, pp. 236-241 (July 1, 1994). |
| | AK43 | Hsu, S.T., "Electron Mobility in SOS Films," *IEEE Transactions on Electron Devices*, Vol. ED-25, No. 8, IEEE, pp. 913-916 (August 1978). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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|---|---|---|---|---|---|---|---|
| | AA44 | | | | | | |
| | AB44 | | | | | | |
| | AC44 | | | | | | |
| | AD44 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE44 | Rubio, A. *et al.*, "Quasiparticle band structures of short-period superlattices and ordered alloys of AlN and GaN," *Physical Review B*, Vol. 49, No. 3, The American Physical Society, pp. 1952-1956 (January 15, 1994). |
| | AF44 | Shul, R.J. *et al.*, "Plasma-Induced-Damage of GaN," *Electrochemical Society Proceedings*, Vol. 96-15, pp. 232-243. |
| | AG44 | Shul, R.J. *et al.*, "High-Density Plasma-Induced Etch Damage of GaN," 10 pages. |
| | AH44 | Shul, R.J. *et al.*, "Comparison of Dry-Etch Techniques For GaN, InN, and AlN," 7 pages. |
| | AI44 | *ION Source Refefence Guide*, Commonwealth Science Corporation, 17 pages. |
| | AJ44 | Shul, R.J. *et al.*, "Inductively Coupled Plasma Etching of GaN," 13 pages. |
| | AK44 | Adesida, I. *et al.*, "Characteristics of chemically assisted ion beam etching of gallium nitride," *Appl. Phys. Lett. 65(7)*, American Institute of Physics, pp. 889-891 (August 15, 1994). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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|---|---|---|---|---|---|---|---|
| | AA45 | | | | | | |
| | AB45 | | | | | | |
| | AC45 | | | | | | |
| | AD45 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE45 | Pearton, S.J. *et al.*, "$Ar^+$-ion milling characteristics of III-V nitrides," *J. Appl. Phys. 76(2)*, American Institute of Physics, pp. 1210-1215 (July 15, 1994). |
| | AF45 | Pearton, S.J. *et al.*, "Letter to the editor: Dry etching of thin-film InN, AlN and GaN," *Semicond. Sci. Technol. 8*, pp. 310-312 (1993). |
| | AG45 | Shul, R.J. *et al.*, "Comparison of Dry Etch Techniques for GaN," 9 pages. |
| | AH45 | Tojyo, T. *et al.*, "GaN-based High Power Blue-violet Laser Diodes," 5 pages. |
| | AI45 | Koike, M. *et al.*, "RT-CW operation of GaN-based Laser Diodes improved by GaN/HaInN optical guiding lasers," 2 pages. |
| | AJ45 | Lagerstedt, O. *et al.*, "Properties of GaN tunneling MIS light-emitting diodes," *J. Appl. Phys. 49(5)*, American Institue of Physics, pp. 2953-2957 (May 1978). |
| | AK45 | Self, K., "Prolog to Emerging Gallium Nitride Based Devices," *Proceedings Of The IEEE*, Vol. 83, No. 10, p. 1305 (October 1995). |

| EXAMINER | DATE CONSIDERED |
|---|---|

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| FORM PTO-1449<br>FIFTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT | ATTY. DOCKET NO.<br>2005.0020003 | APPLICATION NO.<br>09/604,097 |
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| | APPLICANTS<br>Yukio SHAKUDA | |
| | FILING DATE<br>June 27, 2000 | GROUP<br>2828 |

**FOREIGN PATENT DOCUMENTS**

| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA46 | | | | | | |
| | AB46 | | | | | | |
| | AC46 | | | | | | |
| | AD46 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE46 | Mohammad, S.N. *et al.*, "Emerging Gallium Nitride Based Devices," *Proceedings of the IEEE*, Vol. 83, No. 10, pp. 1306-1355 (October 1995). |
| | AF46 | Goldenberg, B. *et al.*, "Ultraviolet and violet light-emitting GaN diodes grown by low-pressure metalorganic chemical vapor deposition," *Appl. Phys. Lett. 62(4)*, American Institute of Physics, pp. 381-383 (January 25, 1993). |
| | AG46 | Shan, W. *et al.*, "Pressure-dependent photoluminescence study of wurtzite GaN," *Appl. Phys. Lett. 66(25)*, American Institute of Physics, pp. 3492-3494 (June 19, 1995). |
| | AH46 | Wang, Y. and Mikkola, D.E., "Shock deformation of sapphire single crystals," *Materials Science and Engineering*, Elsevier Sequoia, pp. 25-32 (1991). |
| | AI46 | Akasaki, I. And Amano, H., "High efficiency UV and blue emitting devices prepared by MOVPE and low energy electron beam irradiation treatment," *Proceedings of SPIE: Physical Concepts of Materials for Novel Optoelectronic Device Applications I: Materials Growth and Characterization*, pp. 138-149 (October 28-November 2, 1990). |
| | AJ46 | Neugebauer, J. and Van De Walle, C.G., "Defects And Doping in GaN," pp. 2327-2330. |
| | AK46 | Abernathy, C.R., "The Role of Hydrogen In UHV Growth of III-V Semiconductors," *Materials Science Forum*, Vols. 148-149, Trans Tech Publications, pp. 3-25 (1994). |

| EXAMINER | DATE CONSIDERED |
|---|---|

**EXAMINER**: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

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| EXAMINER INITIAL | | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUB-CLASS | TRANSLATION |
|---|---|---|---|---|---|---|---|
| | AA47 | | | | | | |
| | AB47 | | | | | | |
| | AC47 | | | | | | |
| | AD47 | | | | | | |

**OTHER (Including Author, Title, Date, Pertinent Pages, etc.)**

| | | |
|---|---|---|
| | AE47 | Wetzel, C. *et al.*, "Excitation Spectroscopy and Level Assignment in Piezoelectric $Ga_{1-x}In_xN$/GaN Quantum Wells," 2 pages. |
| | AF47 | Matsuoka, T. *et al.*, "Wide-Gap Semiconductor InGaN and InGaAlN Grown by MOVPE," *Journal of Electronic Materials*, Vol. 21, No. 2, pp. 157-163 (1992). |
| | AG47 | Albanesi, E.A. *et al.*, "Theoretical study of the band offsets at GaN/AlN interfaces," *J. Vac. Sci. Technol. B 12(4)*, American Vacuum Society, pp. 2470-2474 (July/August 1994). |
| | AH47 | Dissanayake, A. *et al.*, "Low-temperature epitaxial growth and photoluminescence characterization of GaN," *Appl. Phys. Lett. 65(18)*, American Institute of Physics, pp. 2317-2319 (October 31, 1994). |
| | AI47 | Wickenden, D.K. *et al.*, "Thermally annealed GaN nucleation layers and the device-quality metal organic chemical vapor deposition growth of Si-doped GaN films on (00.1) sapphire," *J. Appl. Phys. 75(11)*, American Institute of Physics, pp. 7585-7587 (June 1, 1994). |
| | AJ47 | Saxler, A. *et al.*, "High quality aluminum nitride epitaxial layers grown on sapphire substrates," *Appl. Phys. Lett. 64(3)*, American Institute of Physics, pp. 339-341 (January 17, 1994). |
| | AK47 | |

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